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CompTel

Uncaging Competition:

Reforming Collocation For The 21st Century

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CompTel

Uncaging Competition:

Reforming Collocation For The 21st Century

(CompTel's White Paper No. 2)

Written by Robert Falcone and Joseph Gillan

This white paper is sponsored by the Competitive Telecommunications Association (CompTel). CompTel is a national industry association representing a broad spectrum of members pursuing a variety of strategies to compete in the local, long distance and information services markets. Of paramount interest to CompTel and its members is assuring that the conditions for competition exist across the entire market, bringing the benefits of competition to residential and business consumers throughout the nation.

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Uncaging Competition:
Reforming Collocation for the 21st Century

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Executive Summary

The purpose of this White Paper is to describe a basic set of collocation reforms that will more efficiently accommodate the needs of a rapidly evolving competitive local industry. The fundamental conclusion of the paper is quite simple. The traditional collocation arrangements currently offered by incumbent local exchange carriers (ILECs) are complex, costly and slow to provision. What is more, these traditional methods are particularly ill-suited to the needs of a new generation of competitive entrants interested in offering advanced data services to a broad market of potential customers.

CompTel encourages policy makers to reevaluate the reasonableness and effectiveness of traditional collocation methods. The basic template for collocation is now nearly ten years old. Many common perceptions concerning collocation -- for instance, the *presumption* that physical collocation space should be caged -- can be traced to experimental efforts to open the local market to competition. The entire premise of local competition was new at that time as entrants were fighting for the basic right to compete, and the economic harm caused by unnecessary ILEC conditions could be absorbed more easily when competition was limited to the high margin private line/special access market. The ability to collocate *at all* was the preeminent objective -- and if acceding to a "cage" was necessary to accomplish this goal, then the concession was made.

In the time since collocation was initially debated, however, technology has changed, the market has changed, and the needs of competitors have changed -- but the ILECs continue to adhere to a caged-based view of collocation that increases costs, wastes space and imposes unnecessary delay. Demanding that each entrant be isolated in its own cage severely and adversely constrains collocation-based entrants from offering competitive alternatives to the

ILECs' services. Consequences include:

* Significant delays associated with the complex ordering, construction and provisioning processes of the ILECs.

* Excessive costs caused by unnecessary conditioning activities and wasteful space requirements.

* Limited availability due to claims of space exhaustion at critical central offices.

CompTel's fundamental conclusion is that the traditional view of collocation -- a dedicated cage equaling 100 square feet -- is unnecessarily costly and inflexible, particularly when compared to the collocation profile of new technologies. Continual advances in microelectronic circuitry translate to the need to collocate equipment of decreasing dimension and increasing functionality. xDSL technology alone promises a new wave of entry to the local market. Further, as competition expands beyond urban markets to areas with smaller central offices and lower density, there will be a corresponding need for more efficient and less costly collocation options. Traditional collocation rules which isolate competitive local exchange carriers (CLECs) in dedicated caged space or which limit the types and uses of collocated equipment are inconsistent with these fundamental trends.

Fortunately, an environment of simple, reliable and inexpensive collocation options can be a reality. Lessons from a number of *competitive* markets -- the long distance market, the Internet, and the consensus practices of CLECs themselves -- all provide working models of efficient collocation arrangements. The common denominator of these competitive arrangements is cageless collocation, a method favored for its speed, efficiency and cost. The reason is simple. Uncaged collocation space can accommodate far more collocation customers than a caged

environment. Since a competitive firm *wants* to attract collocation customers, it views the efficient utilization of its space as an important objective.

Importantly, the security concern used by ILECs to justify the requirement that each entrant be caged from one another is just as real in these competitive applications. For instance, it is estimated that more than 60 percent of all *worldwide* Internet traffic (including 85 percent of all intra-European traffic and roughly 40 percent of US domestic traffic) transits a single Internet access point known as MAE East. Nevertheless, within this interconnection point resides the equipment of multiple providers and *none* is protected by its own caged enclosure. The difference is not with the *concern* for security, the difference lies in defining what security measures are *reasonable*.

The prevailing ILEC policy to require caged collocation is nothing more than an ILEC convention, born at a time when potential collocators were first entering the market and had few legal rights. Nothing in the Telecommunications Act of 1996 requires (or even suggests) that the new entrant's right to physical collocation should be constrained to a caged environment. Therefore, the single most important reform of ILEC central office collocation practices would be the elimination of the mandatory cage.

CompTel recommends that regulators consider two basic forms of cageless collocation. In the first form -- Shared Space Collocation -- the ILEC would establish a single area for the collocation of competitors' equipment. This area would be physically separated from the ILEC's equipment, but *within* the shared area, there would be no cages separating one collocator's equipment from another's. In the second form -- Common Space Collocation -- new entrants would be allowed to collocate their equipment within the *same* conditioned space as the ILEC, separated by only whatever delineation (such as a separate aisle) needed to establish a clear

demarcation between the ILEC's and CLEC's equipment.

Under either of these alternatives, reasonable security measures -- that is, security measures comparable to those found in competitive arrangements -- can be easily accommodated. Competitive collocation arrangements approach security with a large measure of common-sense. The most prevalent form of security is the use of locking equipment cabinets, augmented by the most basic security measure, proper labeling. Additional security is provided by card-access that tracks when technicians have had access to the common space or, in some instances, access escorted by an ILEC employee.

Finally, CompTel proposes a variety of reforms to traditional physical (i.e., caged) and virtual collocation. Our goal is to ensure that the collocation offerings of the ILECs are as efficient and as flexible as possible, thereby fostering the competitive local market so central to the nation's telecommunications policy. CompTel recognizes, however, that no single policy or entry strategy can be expected to achieve a competitive local market by itself. While the reforms proposed herein should greatly increase the productive value of collocation to competitive entrants (and, therefore, consumers), we also recognize that significant barriers to local competition will remain. Nevertheless, reforming collocation is an important step in the process of opening the local market to competition.

Amid the details of CompTel's analysis, however, is a broader message and more fundamental conclusion. The purpose of collocation is to foster a competitive environment for the benefit of consumers. Regulators should be concerned with the speed, efficiency and utility of collocation because it will determine the choices and prices paid by consumers. The time is now to reform collocation and come one step closer to the competitive vision embraced by Congress when it passed the Telecommunications Act of 1996.

I. Introduction

One factor important to the development of alternative local networks is ensuring that competitors can efficiently collocate facilities in the central office environment of the ILEC. Traditional "first-generation" efforts addressing collocation, however, have resulted in an unnecessarily expensive, caged collocation environment that is ill-suited to the needs of a new generation of competitive entrants.

The purpose of this White Paper is to describe the "next generation" of collocation offerings that will be necessary to accommodate the broader needs of the rapidly evolving competitive local industry. The fundamental conclusion of the paper is quite simple. Traditional collocation arrangements currently offered by ILECs are complex, costly and slow to provision primarily because of the ILECs' insistence on isolating each entrant to its own dedicated and caged environment.

Fortunately, simple, reliable and inexpensive collocation options can be a reality. Lessons from a number of *competitive* markets -- the long distance market, the Internet, and the consensus practices of CLECs themselves -- all provide working models of efficient collocation arrangements. The common denominator of these competitive arrangements is cageless collocation, a method favored for its speed, efficiency and cost. The competitive experience provides a valuable template that can be used to fundamentally reform ILEC collocation offerings in a manner that will promote local competition and the deployment of advanced technologies.[1]

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[1] This paper focuses on improving collocation opportunities *within* the central office environment. Notably, new technologies and network demands are creating an increasing need to collocate at other points (for instance, at a remote terminal). The issues raised by non-central office collocation, however, are beyond the scope of this paper and will not be addressed here.

This paper will discuss the important role that collocation plays in the expansion of competitive networks and describe how collocation has been implemented thus far.[2] The paper describes the two basic collocation arrangements currently offered by the ILECs (i.e., physical and virtual collocation) and explores how various ILEC policies limit the usefulness of these arrangements. The paper then compares these traditional collocation arrangements to the collocation products offered by competitive carriers. These competitive offerings provide a useful benchmark in terms of cost, flexibility and efficiency to judge the reasonableness of ILEC practices.

The final section of the paper describes a number of reforms intended to sharply reduce collocation costs, to make provisioning intervals shorter, and to use scarce central office space more efficiently. These reforms fall within two categories. First, we recommend that the ILECs embrace "cageless collocation" as a standard physical collocation arrangement. This is the most critical reform required to bring ILEC collocation policies closer to their competitive counterparts. In addition, we suggest a variety of reforms to traditional physical (i.e., caged) and virtual collocation. Our goal is to assure that the collocation offerings of the ILECs are as efficient and as flexible as possible to ensure the competitive local market so central to the nation's telecommunications policy.[3]

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[2] Collocation is necessary for carriers deploying facilities to interconnect with ILEC networks, or to access network elements that will be combined with a CLEC's facilities. Collocation, however, is neither necessary nor appropriate to combine network elements with other network elements obtained from the ILEC. Readers interested in access arrangements appropriate to combining the loop and local switching network elements should request CompTel's White Paper on this topic *Broadening the Base: Combining Network Elements to Achieve Widespread Local Competition*, July 1998.

[3] An early caveat is appropriate. Although collocation is an important tool, no single policy or entry strategy can be expected to achieve a competitive local market by itself. Consequently, while the reforms we propose should greatly increase the productive value of collocation to competitive

II. The Genesis of Traditional Collocation

A. Background

In 1987, consultant Peter Huber posited a world dominated by a "geodesic network" of interconnected and competing providers.[4] Although premature with its conclusions, Mr. Huber's analysis was one of the first to articulate the inevitable transformation of the Bell System's pyramidal architecture towards a "network of networks":

> The old network had a simple Euclidean structure, with an inside and an outside, and clear divisions between them. The new network is described by the mathematics of fractals, with nodes leading into lines, which lead into more nodes, the pattern replicating itself indefinitely down to the smallest scales. The old network made each link in the edifice utterly dependent for support on one link above and one below. Today's smart switches and terminals can hand off and receive traffic and information from all sides. The old pyramid, with all its mass in the center, is being transformed into a geodesic dome, with a profusion of nodes and links unknown in the older architecture, connected around the out side.[5]

The necessary preconditions to achieving a geodesic vision, however, did not exist in 1987 and do not yet exist today. Actually realizing the complex interconnected network predicted by Mr. Huber requires that entrants be positioned to deploy a distributed network,

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entrants, we also recognize that significant barriers to widespread local competition will remain. Achieving a competitive local market is the proverbial journey of a thousand steps and reforming collocation is but one.

[4] See The Geodesic Network: 1987 Report on Competition in the Telephone Industry, Prepared by Peter W. Huber, Consultant to the United States Department of Justice (Jan. 1987).

[5] Id. at 1.6.

overlaying and interconnected to the incumbent's network at any technically feasible point.

Without question, the real estate most important to the development of a distributed network is the conditioned central office space of the ILEC.[6] It is here that the vast network of local loops are concentrated for interconnection with switches and interoffice facilities. Because of its nodal role, the central office provides a unique environment to access network elements, as well as to deploy new technologies which enhance the capability of the elements themselves.[7] Underscoring the importance of the ILEC's wire centers/central offices is the fact that these locations are treated as one of the few (if not only) fixed assets in forward-looking cost models.[8]

It is well recognized that the benefits of competition to *consumers* is directly tied to the ease and efficiency by which *entrants* can configure their networks, access their customers and provide their services. The ability to locate within the ILEC's central office is critical to bringing consumers greater choices and lower prices. Because of the unique role played by the ILEC's central office, access to this space became an early priority of those state commissions that first opened the local network to competition. The New York Public Service Commission established the basic parameters of collocation with its precedential efforts to open the private

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[6] The term "conditioned central office space" refers to space that is environmentally prepared (with appropriate electrical, air conditioning and fire protection) to house telecommunications equipment.

[7] The most visible of these technologies is the Digital Subscriber Line Access Multiplexer (DSLAM), a device capable of providing high-speed data services in addition to a customer's traditional voice service over an analog copper loop.

[8] The "fixed wire center" assumption lies at the heart of the HAI cost model favored by competitive entrants, as well as the INDETEC BCPM model supported by ILECs. The fixed wire-center assumption has been widely adopted by state commissions establishing network element prices and is critical to determining potential universal service support at both the federal and state levels.

line market to competition.[9] The pioneering work of this (and other) state commissions laid the foundation for subsequent federal rules,[10] and ultimately the Telecommunications Act of 1996 (1996 Act).

It is important to appreciate that the basic template for collocation is ten years old. Many common perceptions concerning collocation -- for instance, the *presumption* that physical collocation space should be caged -- are a product of the initial (and inherently experimental) efforts to promote local competition. Significantly, these inaugural efforts at collocation occurred in a far different environment than today. The entire premise of local competition was new, requesting carriers were fighting for their basic rights to compete, and the economic consequence caused by unnecessary ILEC conditions were more easily absorbed in a market of much higher retail prices, especially for the special access and private line services then opening to competition. The ability to collocate *at all* was the preeminent objective -- and if acceding to a "cage" was necessary to accomplish this goal, then in those early days such a trade-off was reasonable. As a result, ILEC policies (such as the cage) were accepted without critical examination by entrants thankful for any opportunity to compete.

In the time since collocation was initially debated, however, technology has changed, the market has changed, and the needs of competitors have changed -- but the ILECs continue to adhere to a caged-based view of collocation that increases costs, wastes space and imposes

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[9] See Regulatory Response to Competition, Opinion No. 89-12, Case at 21-32 (NY PSC May 16, 1989) (ordering private line interconnection); Ordering Regarding OTIS II Compliance Filing, Cases 29469 and 88-C-004 (NY PSC May 8, 1991) (approving physical collocation tariff for private line interconnection).

[10] For instance, note the progression of orders by the Federal Communications Commission in CC Docket No. 91-141, Expanded Interconnection with Local Telephone Company Facilities.

unnecessary delays. The mere fact that most ILEC collocation offerings *currently* require cages is no justification for *continuing* the practice in the future. Before addressing alternatives, however, it is useful to establish a baseline understanding of the common forms of collocation offered today.

B. The Standard: Physical Collocation

There are two basic forms of collocation: physical collocation and virtual collocation. Because these terms frequently are used imprecisely, it is appropriate to begin with a clear understanding of how the terms are used here. The basic distinction between physical and virtual collocation is *ownership*. With physical collocation, the entrant owns the equipment whereas with virtual collocation, the entrant leases its equipment to the ILEC. In either event, the equipment is located within the office itself (albeit in different areas and under different conditions).[11]

Physical collocation requires the lease of space in the ILEC's premise.[12] In its present form, physical collocation space is typically an area segregated from the ILEC's equipment and is generally located in a common area accessible to all CLECs. Within this common area, each

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[11] In a sense, the term "physical collocation" is redundant. Because the purpose of collocation is to locate network equipment within the ILEC's conditioned central office space, a successful collocation *requires* a physical occupation.

[12] The FCC defines premises "broadly to include LEC central offices, serving wire centers and tandem offices, as well as all buildings or similar structures owned or leased by the incumbent LEC that house LEC facilities. We also treat as incumbent LEC premises any structures that house LEC network facilities on public rights-of-way, such as vaults containing loop concentrators or similar structures." Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, First Report and Order, 11 FCC Rcd 15499 , para. 573 (1996) ("Local Interconnection Order").

CLEC's dedicated space is then isolated from other CLECs by a chain-link fence, more commonly called a "cage."[13] The CLEC, using a vendor approved by the ILEC, installs its equipment within its enclosed space and has subsequent access to the equipment for all maintenance and repair activities that are required.

The basic parameters of the typical physical collocation arrangement offered by an ILEC:

Space Allocation:[14] ILECs generally offer space on a first come, first served basis.[15] If a collocated CLEC wishes to expand its existing space, it is only allowed access to contiguous space if such space is available. No carrier (ILEC or CLEC) is permitted to warehouse collocation space.[16] ILECs are not required to expand existing facilities to accommodate requests for physical collocation when existing space is exhausted.[17] ILECs are not permitted to set a maximum space limitation on a CLEC unless the ILEC can demonstrate that such a limitation is necessary due to space constraints.

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[13] BellSouth demands a more costly approach by requiring that the space be enclosed with gypsum wallboard.

[14] See Local Interconnection Order, paras. 585-86 (setting guidelines for space allocation).

[15] A CLEC's priority in the collocation "queue" is determined by the receipt date of the collocation application and the payment of appropriate application and/or engineering fees.

[16] To the extent that an ILEC reserves space, it has the effect of limiting the space available to satisfy collocation requests by CLECs.

[17] In these instances, the only current alternative to a physical collocation arrangement is a virtual collocation arrangement (the topic of virtual collocation will be addressed in the next section of this paper). As explained in the last section of this paper, however, there are ways to "expand" available collocation space by moving administrative offices or reclaiming central office space by retiring obsolete equipment. See Section IV.

Use of Collocated Space: CLECs are entitled to collocate equipment used for interconnection and/or access to unbundled network elements. Traditional examples of the types of equipment CLECs would install to perform these functions include transmission equipment, digital loop carrier systems, remote switching units,[18] and testing and monitoring equipment. Equipment must be for the provision of telecommunications service.[19] Equipment installed by the CLEC must comply with the BellCore Network Equipment Building Systems (NEBS) General Equipment Requirements.[20] The equipment is purchased by the CLEC and installed in the enclosed collocated space by a vendor certified by the ILEC. The CLEC is responsible for the design, engineering, monitoring, testing, performance, maintenance and repair of the equipment installed in the collocated space. Most ILECs currently prohibit the CLEC from subleasing or sharing its collocated space with another CLEC for the installation of the second CLEC's equipment.

Interconnecting Collocated Equipment with CLEC's Network Facilities: The CLEC may choose to use its own (or facilities purchased from a third party) entrance facilities, or it can lease dedicated transport facilities to connect its collocated equipment with its own network components. When the CLEC provides its own entrance facilities, the ILEC will designate a point of interconnection, usually located in an entrance manhole or cable vault. The CLEC is

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[18] The FCC did not impose a general requirement that switching equipment be eligible for collocation (Local Interconnection Order, para. 581). As a result, CLECs have had to arbitrate the right to locate remote switching units in each state.

[19] Equipment used exclusively to provide enhanced or information services is generally not permitted. Local Interconnection Order, para. 581.

[20] NEBS requirements typically address electrical, fire and environmental parameters. Some NEBS requirements, however, impose "quality of service" standards, such as acceptable levels of expected outage. Although an ILEC may legitimately be interested in the former, the latter category (i.e., quality measures) should be solely within the discretion of the CLEC.

responsible for installing entrance cables to this point with sufficient length to allow the ILEC to extend the cable from the point of interconnection to the collocated equipment.[21]

Demarcation Point: A common point of termination (POT) frame is generally installed in the collocation common area. This frame serves as a demarcation point where the network of the ILEC and the network of the CLEC meet. Each party is responsible for maintenance and trouble-shooting the equipment on its respective side of the demarcation point.[22]

CLEC Interconnection within a Collocated Area: FCC rules permit two or more collocators to interconnect their networks at the ILEC's premises.[23] This form of cage-to-cage interconnection is accomplished by extending cables from the cage of the first CLEC to the cage of the second CLEC. These cables are terminated at the appropriate transmission equipment to make for an efficient and cost effective means of establishing an interconnection arrangement between the CLECs.

Access to the Collocated Equipment and Security: Generally the CLEC's employees or authorized agents have access to the collocated equipment twenty-four (24) hours a day, seven (7) days a week. Where possible, this access is provided through a secure entrance available to

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[21] Many ILECs will allow dual entrance facilities in locations where such capacity exists. The "dual entrance" strategy affords the CLEC greater protection by providing two separate routes for the CLEC's entrance facilities.

[22] It is also noteworthy that the POT frame itself is entirely redundant, wastes space, increases cost and introduces an unnecessary point of potential failure. A more efficient configuration would simply extend cables from the ILEC's distribution frame directly to the CLEC's cage without this intermediary point.

[23] Local Interconnection Order para. 594.

CLEC employees displaying the proper identification badge or having security entrance cards issued by the ILEC. In those locations where a secure entrance is not available, an ILEC may require the CLEC's employees and agents to be accompanied by a security escort at the CLEC's expense. Buildings that are not normally staffed may require the dispatch of an ILEC employee or security escort so that the CLEC may gain access to its equipment installed in these locations.

ILEC Charges: ILEC rates for physical collocation typically vary state-by-state, and often building-by-building. Wholly aside from rate levels, ILEC collocation pricing is complex, with multiple charges and rate elements. The following table portrays the types of physical collocation charges that an ILEC will typically impose:[24]

[24] In addition to these charges by the ILEC, the CLEC also incurs its own internal costs purchasing, installing, maintaining and repairing its collocated equipment.

Table 1: Typical ILEC Charges for Physical Collocation

Non-Recurring Charges	Monthly Recurring Charges
Application	Lease of Floor Space (per square foot)
Space Preparation[25]	Power (per amp)
Cable Support Structure	Cable Support Structure
Space Enclosure Construction	Cross-connections
Cable Installation	POT Bay Connections
Security Escort (when necessary)	Entrance Fiber Termination[27]
Cross-connections	
Fiber Placement[26]	

C. The Alternative: Virtual Collocation

Virtual collocation is an attempt to achieve the same economic outcome -- i.e., the same service choices and business opportunities -- as physical collocation, without the CLEC having to first establish secure dedicated space within the ILEC's central office. Virtual collocation is

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[25] This fee is usually developed by the ILECs on an building-by-building individual case basis.

[26] This fee is assessed for extending the CLEC's facilities from the point of interconnection to the riser cables. Fees include charges for all splice work required to make these connections.

[27] This charge is for the riser cable and associated frame terminations.

generally used in those ILEC central offices that cannot support a physical collocation arrangement, or in cases where the CLEC only wishes to install a small quantity of equipment and does not want to lease the minimum footprint required with a physical collocation arrangement. Originally posited as an *alternative* to physical collocation where space was unavailable, the option is sometimes *preferred* because of the space-hungry needs of conventional (i.e., caged) physical collocation. In many instances, caged collocation space is simply unnecessary, and because so few options exist today -- a condition this paper hopes to correct -- virtual collocation plays an important role.

With virtual collocation, the CLEC is able to install equipment in the ILEC's central office without having to lease dedicated space. Instead, the CLEC leases its equipment to the ILEC for a nominal fee (usually $1) and an ILEC-approved vendor installs the equipment on the ILEC's premises.[28] The equipment is commonly installed in an area where it is intermingled with the ILEC's equipment. Performance monitoring and alarming of the collocated equipment -- functions which are typically performed remotely -- generally remain the responsibility of the CLEC. ILEC technicians, however, perform all maintenance and repair work on the CLEC's equipment at the CLEC's direction.[29]

ILEC Charges: Like standard physical collocation, ILEC charges for virtual collocation are varied and complex. The following table outlines typical charges that are imposed with virtual collocation:[30]

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[28] In some instances, ILEC technicians must be used to install virtually collocated equipment.

[29] Generally, the CLEC is denied direct access to its equipment until such time as the CLEC wishes to remove or retire the equipment.

[30] These costs do not include the CLEC's equipment costs or its internal costs for monitoring the collocated equipment and directing the maintenance activities of the ILEC.

Table 2: Typical ILEC Charges for a Virtual Collocation Arrangement

Non-recurring Charges	Recurring Charges	Per Occurrence Charges
Application	Entrance Fiber Termination[34]	Rearrangement Charges
Planning, Engineering and Installation Fees[31]	Cable Support Structure	Training[37]
Interconnection[32]	Power (per amp)	Maintenance
Fiber Placement[33]	Equipment Support[35]	Miscellaneous Labor[38]
	Cross-connections	
	Storage[36]	

[31] These fees are typically equipment specific and based on the types and quantities of equipment being installed.

[32] Charges for engineering, furnishing and installing the cables between the collocated equipment and the ILEC's distribution frames.

[33] Charges for extending CLEC facilities from the point of interconnection to the riser cables. Fees include charges for all splice work required to make these connections.

[34] Recurring rate for the riser cable and associated frame terminations.

[35] Rate includes charges for rack space, environmental support, central office alarms, etc.

[36] Charge for the storage of CLEC provided test equipment, tools and spare components such as plug-ins.

[37] Charges to train ILEC technicians to maintain the CLEC's equipment. Charges include training fees, materials, travel costs (airfare, lodging, surface transportation, meals) and technicians' work time.

[38] Charges for work that is not part of routine or emergency maintenance of collocated equipment. An example of an additional labor cost is the security escort that would be required if the CLEC wished to visit its collocation site.

D. The Competitive Limitations of Traditional Collocation

Initial efforts to define competitively useful collocation arrangements have produced mixed results. Although existing practices accommodated a first wave of entry in several markets, significant problems remain. Moreover, "first-generation" collocation offerings do not consider the more varied collocation needs of new technologies that support advanced data services. Of course, these problems should not be surprising. As noted at the beginning of this section, the basic approach to traditional collocation is nearly ten years old and was developed as a "theory" which predated any practical experience with local competition.

As explained below, the principal source of many of the practical problems with traditional collocation is the requirement that each collocator be isolated in its own unique caged environment. The consequences of this single requirement affect nearly every dimension of collocation: availability, cost and provisioning. In the current environment, the only means to avoid the cage -- virtual collocation -- requires that the CLEC surrender important access to its equipment.[39] By tying the CLEC's access to its acceptance of a caged environment, however, competitive opportunities are lost and new technologies frustrated.

The principal concerns with existing collocation arrangements (both virtual and physical) fall into the following categories:

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[39] As explained in the final section of this paper, there is no reason for such a penalty to exist. Alternatives *can be* implemented which allow entrants more efficient access to central office space without the need for dedicated, caged space.